men at that depth did not know of it at all until they came out of the mine. No damage was done to any of the mines. The deepest workings are seven hundred feet.

As an interesting coincidence, I will mention, that, while in the Salt River valley two weeks ago, I was informed by Mr. Frank Cushing the ethnologist, who is making extensive excavations in the old ruins abounding there, that one of the principal if not the main cause of the abandonment of so populous and fertile a valley was earthquakes. As there are no records of any occurring since that time, Mr. Cushing may take the blame of suggesting this. I am without trustworthy information concerning the extent of the disturbance; but, as near as I can judge, it is about twelve hundred miles long by six hundred in width. There were no magnetic disturbances whatever.

Since writing the above, additional information has come to hand that modifies my opinion somewhat as to the extent and character of this disturbance. From Señor Campi and Mr. L. A. Richards of Sonora, I am informed that the disturbance in their section of the country was profound. They are living in Sonora, Mexico, about two hundred miles south of here, in the Fronteras valley. The first shock was felt there about three o'clock on May 3. In Fronteras ten houses were thrown down, one child was killed, and one woman fatally injured. In Cumpas, still farther south, four houses were destroyed, no one hurt. Extending the entire length of the valley, over one hundred miles, are fissures varying in width from a few inches to ten feet, having a northerly and southerly direction. From this information it is safe to conclude that the centre or area of worst vibration lies to the south of this and in Mexico. It will take at least a month to secure requisite information to make a report. That country is sparsely settled, with no telegraphic communication or railroads; nothing but wagon-roads, and those very poor. These gentlemen confirm the report of mountain fires immediately succeeding the shock. They think that the entire valley has subsided a little.

Also at the San Bernardino ranch, ninety miles south-east of here, all the buildings on the place were thrown down. They were built of adobe, and were substantial. This place lies within a short distance of some extinct craters, and is in the centre of an ancient volcanic belt.

Later reports make the disturbance in Mexico, about the same region mentioned above, as very destructive. As some lack verification, I defer reporting them until further word is received.

G. E. GOODFELLOW.

Tombstone, A. T., May 7.

Defence of a civil academy.

The editorial columns of *Science* (May 13, 1887) are guilty of a manifest inconsistency upon the subject of state aid to the higher education. In your first column you condemn, in strong language, my idea of a civil academy at Washington, proposed in the circular of information, No. 1, 1887, bureau of education. In your fifth column you quote, with evident respect, Professor Jowett's views upon government aid to the university colleges of England. You even give publicity to this statement, without dissent: "No principle of political economy forbids the application of public money to the education of those who cannot afford to help themselves. Such an expenditure is really one of the best affairs of business in which a nation can engage." You venture to add that there is some prospect of Dr. Jowett's plea being effective. While it is not to be expected, in the present transitional stage of political economy and in the present condition of American politics, that all men should agree upon the necessity of education and science for good government, it is at least fair to demand some degree of consistency in a scientific journal.

Furthermore, I beg to differ from your opinion that this country is dotted with colleges where any young man may obtain all needful political education. If there is one thing needful at the present time in our American civic life, it is instruction in the art of administration. Over against your statement, let me place that of Mr. Dorman B. Eaton, recently expressed before the graduate students of history and politics in the Johns Hopkins university. From his practical connection with the civil-service commission, he may be presumed to know what he was saying. He said there was not a single institution in the United States where a man could learn what reformers wish to know about scientific methods of administration. Mr. Eaton may have ignored one or two oases of political training in this country; but every fair-minded man must admit, upon reflection, that American colleges do not teach this subject. You say it is well enough to train men for the army and navy, but intimate that our prospective civil servants can acquire adequate training "from any village school, and will not ask the government for alms that they may the later live from the public purse." No, our public men sometimes try to carry the entire bag, and distribute public bounty, or 'spoils,' to all their friends and constituents. They even vote in state legislatures for free text-books in common schools, and allow publishers to corrupt school-committees. Who teaches 'the homely proverbs of Poor Richard' to our local politicians nowadays, and who ever heard of the A B C of finance in 'any village school'? Do the spoils system and the history of American legislation, municipal, state, and national, indicate that our public servants have been well grounded in common honesty and *good* political economy? Before pronouncing judgment upon my suggestion as *poor* economy, you might profitably compare the cost of scientific administration with the present American system. Materials for the comparison may be found in the civil lists of various European countries.

My plea was for a civil-service academy, recruited by congressional appointment from men pronounced fit by our state universities. It was for a civic West Point. It was for the political training of able and mature young men in a political environment, in the capital of the nation. It was a plea for opening the channel of communication between our universities and public life, between political science and political praxis. I proposed that the highest education in the country and the most expert talent now in the service of the government should both be made tributary to the training of picked young men for a term of two years, partly by lectures, and more especially by practical work in government bureaus, after the manner of the seminary connected with the Statistical bureau in Berlin, which is recruited by university graduates of the highest ability.

This is no visionary, unpractical scheme. It has been realized, in one form or another, by most European states. The idea is slowly evolving in connection with our own government departments. The state department has in training a body of consular clerks. The navy details men for special study in Greenwich, Paris, and Baltimore. The war department has also allowed men to study in Baltimore laboratories. Mr. Trenholm, the comptroller of the currency, says he is going to select the brightest young men he can find, and train them for bank-examiners. The idea is in the air at Washington, and it will sooner or later find a lodgement in every department and bureau. You will probably hear of it next week from Col. Carroll D. Wright, commissioner of the bureau of labor, in his address on the study of statistics in American colleges, before the American economic association, at its meeting in Cambridge, May 24, 1887. Statistical science, finance, forestry, agrarian economy, consular duties, and diplomacy have never yet been taught, to any considerable extent, in our American schools and colleges. You might as well expect a corps of military engineers to evolve from the state militia as to suppose that the higher arts of administration can be acquired by either school or college training. Administration is one of the highest branches of scientific politics, and it seems to me that *Science* ought to recognize the fact. As to the diplomatic service, a Boston gentleman, who has had much experience in this connection, writes, "I have had a good deal to do with some of our diplomatic servants in Europe, and have often been put to the blush for their incompetency to perform their duties. Why should we not have a diplomatic service like other nations, and why should we not have a national institution in which the students should be taught, among other things, diplomacy?"

HERBERT B. ADAMS.

Johns Hopkins univ., May 16.

The occurrence of similar inventions in areas widely apart.

The leading idea of Otis T. Mason's writings on ethnology is his attempt to classify human inventions and other ethnological phenomena in the light of biological specimens. "They may be divided into families, genera, and species. They may be studied in their several ontogenies (that is, we may watch the unfolding of each individual thing from its raw material to its finished production). They may be regarded as the products of specific evolution out of natural objects serving human wants and up to the most delicate machine performing the same function. They may be modified by their relationship, one to another, in sets, outfits, apparatus, just as the insect and flower are co-ordinately transformed. They observe the law of change under environment and geographical distribution." This method of research is founded on the hypothesis that a connection of some kind exists between ethnological phenomena of people widely apart. Professor Mason is of this opinion, and expresses it as follows: "Anthropologists assign similar inventions observed in different parts of the world to one of the following causes: 1. The migration of a certain race of people who made the invention. 2. The migration of ideas — that is, an invention may be made by a certain race or people and taught or loaned to peoples far removed in time and place. 3. In human culture, as in nature elsewhere, like causes produce like effects. Under the same stress and resources the same inventions will arise." From this stand-point Professor Mason has arranged the ethnological collections of the national museum according to objects, not according to the tribes to whom they belong, in order to show the different species of throwing-sticks, basketry, bows, etc.

We cannot agree with the leading principles of Professor Mason's ethnological researches. In his enumeration of causes of similar inventions, one is omitted, which overthrows the whole system: unlike causes produce like effects. It is of very rare occurrence that the existence of like causes for similar inventions can be proved, as the elements affecting the human mind are so complicated; and their influence is so utterly unknown, that an attempt to find like causes must fail, or will be a vague hypothesis. On the contrary, the development of similar ethnological phenomena from unlike causes is far more probable, and due to the intricacy of the acting causes. As far as inventions are concerned, the disposition of men to act suitably is the only general cause; but this is so general, that it cannot be made the foundation of a system of inventions.

But from still another point of view we cannot consider Professor Mason's method a progress of ethnological researches. In regarding the ethnological phenomenon as a biological specimen, and trying to classify it, he introduces the rigid abstractions species, genus, and family into ethnology, the true meaning of which it took so long to understand. It is only since the development of the evolutional theory that it became clear that the object of study is the individual, not abstractions from the individual under observation. We have to study each ethnological specimen individually in its history and in its medium, and this is the important meaning of the 'geographical province' which is so frequently emphasized by A. Bastian. By regarding a single implement outside of its surroundings, outside of other inventions of the people to whom it belongs, and outside of other phenomena affecting that people and its productions, we cannot understand its meaning. The only fact that a collection of implements used for the same purpose, or made of the same material, teaches, is, that man in different parts of the earth has made similar inventions, while, on the other hand, a collection representing the life of one tribe enables us to understand the single specimen far better. Our objection to Mason's idea is, that classification is not explanation.

His method, as far as applied to objects which have a close connection with each other, is very good. The collection of moon-shaped Eskimo knives or labrets from North-west America has given us great pleasure, and enables us to trace the distribution of those implements; but even they do not fully answer the purpose of ethnological collections. Besides these, we want a collection arranged according to tribes, in order to teach the peculiar style of each group. The art and characteristic style of a people can be understood only by studying its productions as a whole. In the collections of the national museum the marked character of the North-west American tribes is almost lost, because the objects are scattered in different parts of the building, and are exhibited among those from other tribes.

Another instance will show that the arrangement